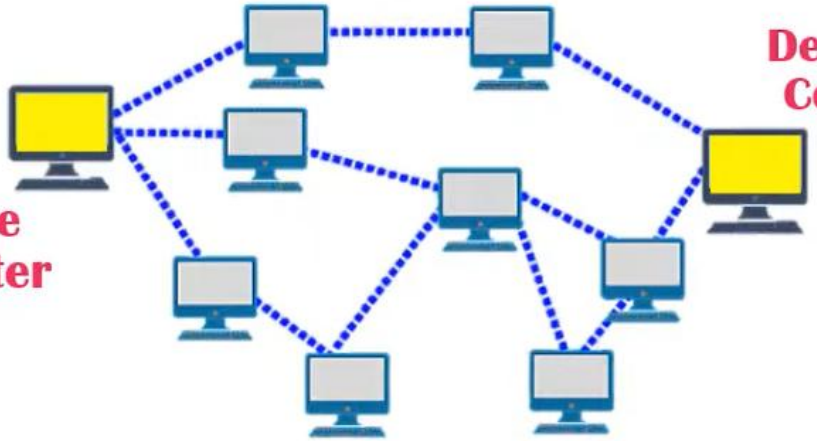
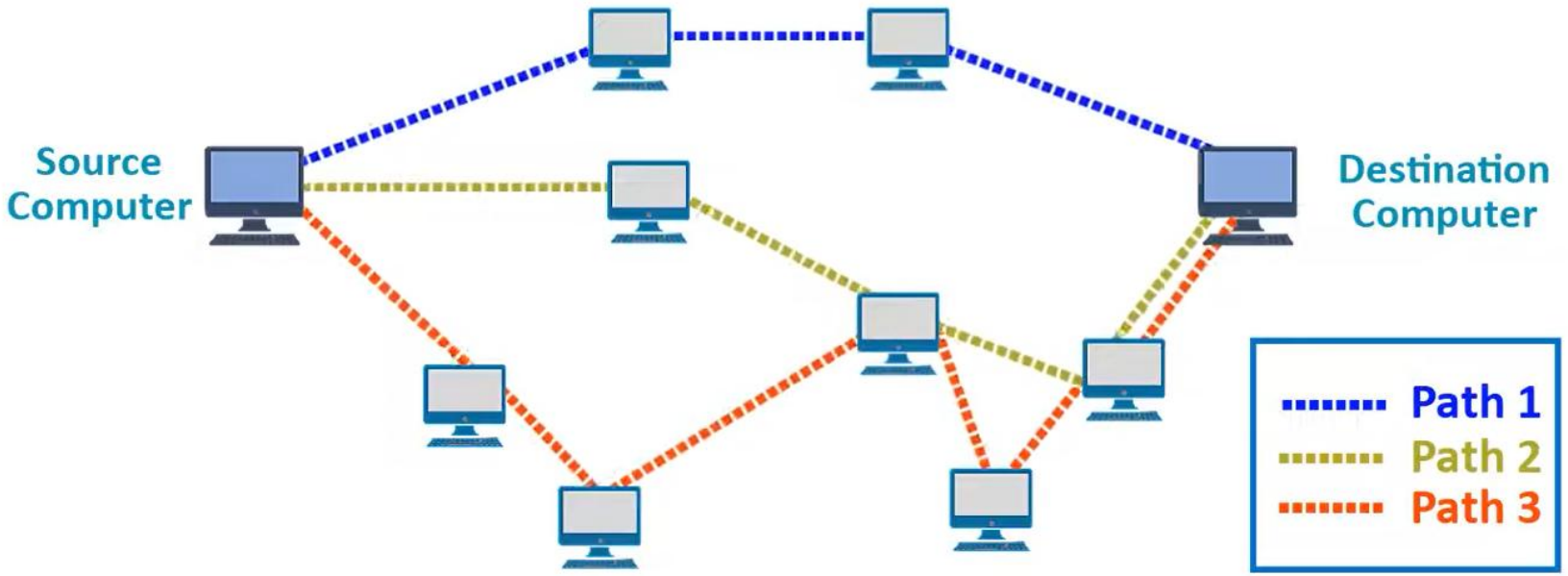
Switching Techniques

- Circuit
- Message
- Packet
  - Virtual
  - Datagram

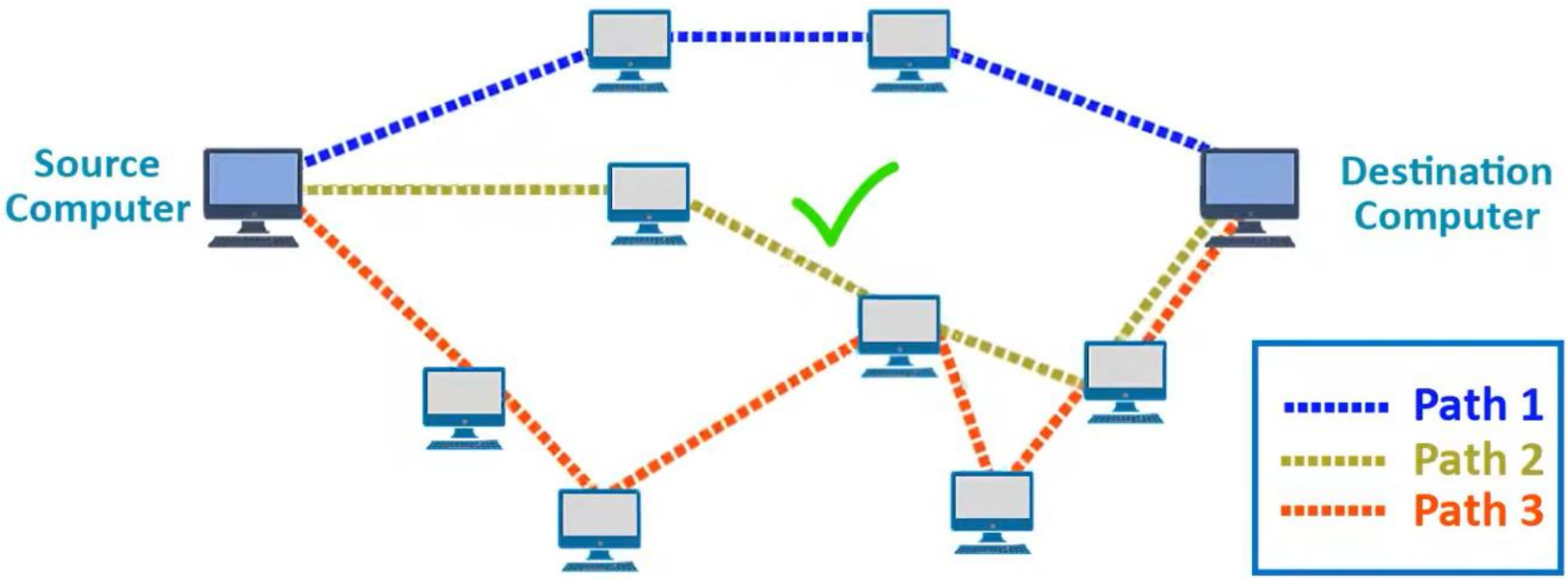


SWITCHING

In a computer network there can be more than one path from Source to Destination Computer

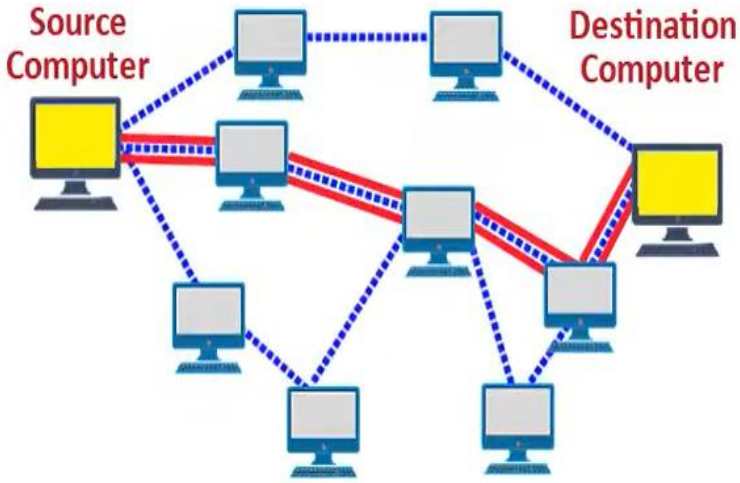


Selecting a path that data must take out of the available options is called Switching



Three Switching Techniques

CIRCUIT SWITCHING



Characteristics

- Circuit is established between the two ends
- Dedicated path for data to travel from one to the other end
- Resources are reserved at intermediate switches
- The intermediate switches are connected by the physical link

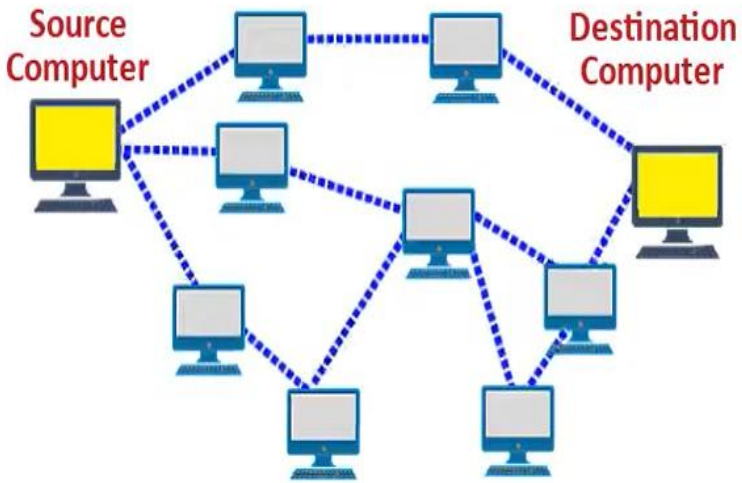
Advantages

- Well defined and dedicated path exists for the data to travel
- No waiting time at any switch
- Data is transmitted without any delay
- Data always reaches the other end in order

Disadvantages

- Channel is blocked for duration of transmission
- Inefficient in terms of utilization of system resources
- Time required for establishing the circuit is too long. Requires more bandwidth.

Message Switching



Characteristics

- There is no dedicated path to transfer data from sender to receiver.
- The message is only forwarded from hop to hop.
- When any intermediate switch receives the message, it stores the entire message.
- The message is stored until sufficient resources become available to transfer it to the next switch.
- This is called as Store and Forward technique

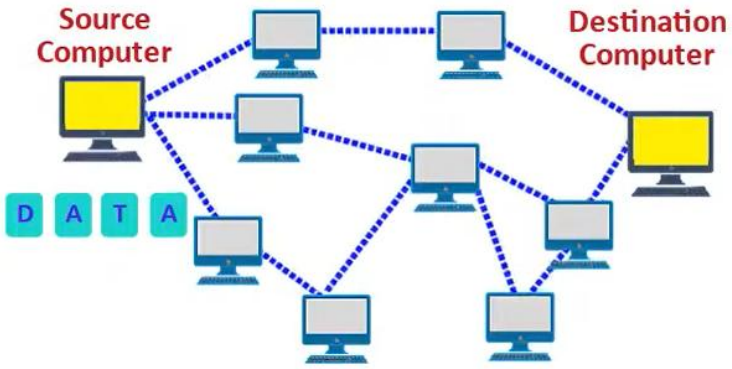
Advantages

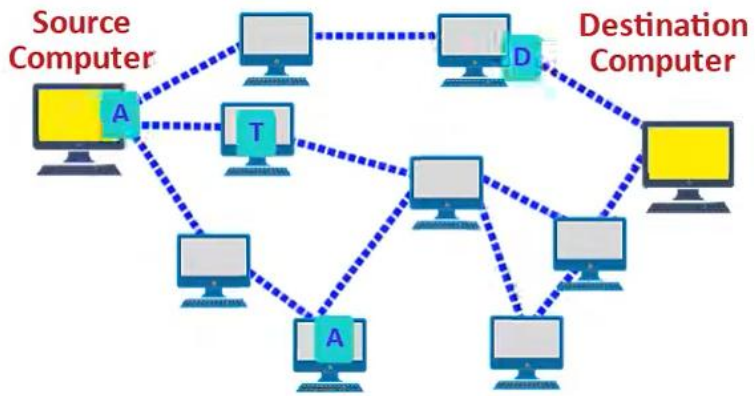
- Channel is not blocked
- More devices can share the channel
- Helpful in reducing traffic congestion as the message can be stored in the route and forwarded whenever required

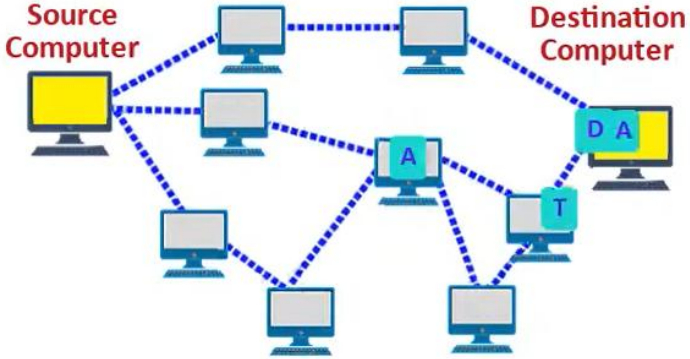
Disadvantages

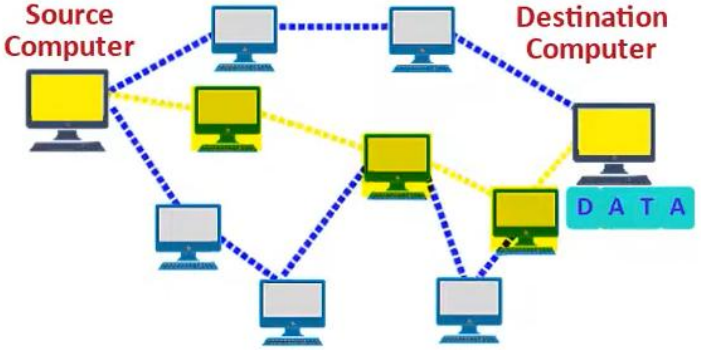
- Requires enough storage at every switch to accommodate the entire message during the transmission.
- It is extremely slow due to store and forward technique.

PACKET SWITCHING

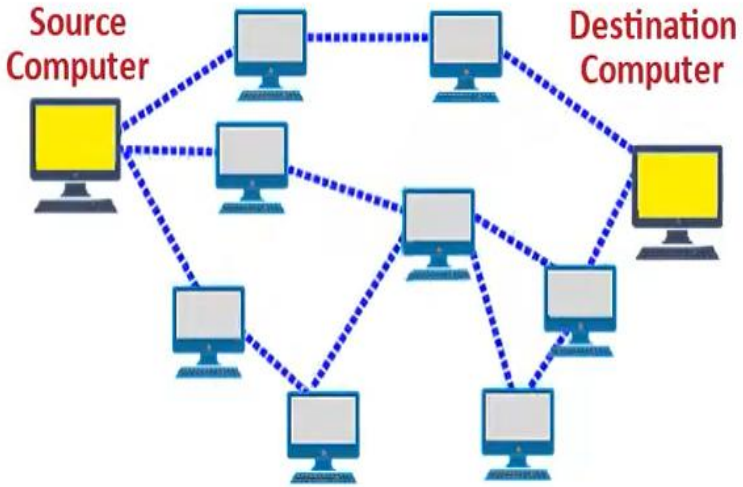








PACKET SWITCHING



Characteristics

- Message to be sent is divided into multiple smaller size packets. This process is called as packetization.

Virtual Circuit Switching

- The first packet informs all intermediate switches
- First packet reserves resources - CPU bandwidth
- All the packets follow the same path

Datagram Switching

- Each packet is treated as separate entity
- It is routed independently through the network

Advantages

- Cost effective, easier to implement
- Uses lesser bandwidth
- It does not take large amount of space
- If packet is lost you can request for new packet

Disadvantages

- Unsuitable for applications that cannot afford delays in communication e.g. voice calls
- Has high installation costs.
- Require complex protocols for delivery.
- Error, Delay in delivery or loss of packets.

Switching Techniques

Circuit Switching	Message Switching	Virtual Packet Switching	Datagram Packet Switching
Connection Oriented	Connection Less Service	Connection Oriented	Connection Less Service
Follows Dedicated Path and Blocks Resources	No dedicated path, needs storage at each switch	Follows Dedicated Path and Blocks Resources	No dedicated path, needs storage at each switch
Entire message is sent together	Entire message is sent together	Message is broken down into packets	Message is broken down into packets
One header for the entire message	One header for the entire message	Only first packet has Global Header	Global Header in all packets
Causes Traffic Congestion	Reduces Traffic Congestion	Can Cause Traffic Congestion	Reduces Traffic Congestion
Call Setup Delay	Data Transmission Delay	Call Setup & Data Transmission Delay	Data Transmission Delay
No loss of information	No loss of information	No loss of information	Packets can get lost
Expensive + Easy	Cost Efficient + Easy	Expensive + Complex	Cost Efficient + Easy